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The study examined the relationship between cognitive performance and the use of private speech in 20 learning disabled children, aged 81 to 108 months. Half of the children were hyperactive. Each child was given a series of cognitive tasks and played alone in a room for 7 minutes. Videotapes of the free play were later transcribed and coded according to the type of private speech used. Use of private speech was reflective of the level of cognitive maturity of the children, with children who talked most in this sample being of an intermediate level of skill in task performance. (Author)

# The Private Speech of Learning Disabled Children

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This study examined the relationship between cognitive performance and the use of private speech in 20 learning disabled children, age 81 to 108 months. Half the children were hyperactive, half were not. Each child was given a series of cognitive tasks and played alone in a room for seven minutes. Videotapes of the free play were later transcribed and coded according to the type of private speech used. Use of private speech was reflective of the level of cognitive maturity of the children, with children who talked most in this sample being of an intermediate level of skill in task performance.

## The Private Speech of Learning Disabled Children

### Statement of Problem

The importance of private speech (talking aloud while in a room alone, or addressed to no one else) has been noted throughout recent years by Piaget (1955/1923), Luria (1961), Vygotsky (1962), and others (see Zivin, 1979, for an excellent historical perspective). In particular, among children from 2 to 12 years, the use of private speech has been found to be related to developmental maturity (Beaudichon, 1973; Kohlberg, Yaeger, & Hjertholm, 1968), impulsivity (Copeland, 1979; Kleiman, 1974; Meichenbaum, 1975), and verbal ability (Kleiman, 1974). With atypical populations, private speech has been studied as a way to further understanding of particular disabilities. For example, Copeland (1979) found hyperactive children to talk more than nonhyperactive children, and to use less self-regulatory speech, suggesting a possible developmental lag. Especially with the recent increase in use of therapeutic techniques which emphasize teaching children to use self-regulatory speech (Meichenbaum, 1977), and in particular with the adaptation of these techniques for learning disabled children (Bower, 1975; Epstein, 1975), private speech with this population is important to examine. Describing the use of private speech and its relationship to cognitive skill for learning disabled children was the goal of this project. In response to recent suggestions that hyperactive LD children should be examined separately from nonhyperactive LD children, a secondary goal was to examine whether differences exist in the use of private speech by these two groups.

### Method

Subjects. Twenty learning disabled (LD) children, aged 81 to 108 months, participated in this project. All children were of average IQ, were at

least two years behind expected grade level in reading and/or arithmetic achievement, and, after a thorough language and perceptual diagnostic battery, had been classified as LD by the school psychologist. Ten of these children were hyperactive (LD-H), based on a concurring diagnosis by a physician and teacher rating on the Conners (1969) Teacher Questionnaire, Hyperactivity Factor ($M$ = 3.65, $SD$ = .29), and ten had never been diagnosed as or referred for hyperactivity (LD-N) (Conners ($M$ = 1.73, $SD$ = .55).

Procedure. An adult examiner individually administered each of the following tasks to each child:

1. Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children - Revised (WISC-R) -- The scaled scores on these subtests were used as brief estimates of the child's levels of verbal and non-verbal cognitive functioning, respectively.
2. Conservation tasks -- Tasks to measure the development of Piagetian conservation of length, number, weight, and volume were used as indications of cognitive maturity.
3. Conceptual style test (Kagan, Moss, & Sigel, 1963) -- This measure of cognitive maturity requires a child to choose two of three pictures on a card (a total of 16 cards) which "go together" and to explain his/her choice. The child's reasoning is categorized into one of three developmentally-related strategies; the analytic strategy, grouping according to small details, and the superordinate strategy, grouping by classification, are the more mature strategies and the functional strategy, grouping according to the relationship between items, is the less mature type (Kagan, Rosman, Day, Albert, & Phillips, 1964).
4. Twenty-Questions test (Mosher & Hornsby, 1966) -- Here, the child must guess, by asking yes/no questions, which of 20 flowers the

experimenter is thinking of; the flowers varied on four dimensions (color of flowers, color of stems, number of petals, and size). The organization of the child's method of discovery on three trials were categorized into one of four styles: focus (narrowing the possibilities by asking about attributes), scan (guessing, in an organized order), random (guessing, in no organized order), and mixed (some combination of these). The focus strategy has been found to be used more by older children (Ault, 1973; Mosher & Hornsby, 1966; Van Horn & Bartz, 1968).

In addition, each child played in the experimental room alone for seven minutes while his behavior and private speech were videotaped. Available for play were a punching doll, a coloring book, toy cars, modeling clay, a paddle-and-ball game, and a ball catching game. The children were given no special instructions about what or how to play during this period. The videotapes were later transcribed and coded according to types of private speech used. The categories used were adapted from Fuson (1979); reliability above 95% was found for each category. Each utterance, defined as a discrete sentence or a series of words separated from the previous utterance by at least two seconds, was classified into one of the following categories:

Regulatory private speech

Describing thing or environment

Describing own actions

Describing own internal state

Commands to self

Questions

Response to questions

Self-feedback

Affective private speech

Word play

Singing

Non-feedback emotional expressive

Laughing

Fantasy/Roleplaying

Imitating persons

Imitating objects, sound effects

Commands to inanimate objects

Describing past or present action

Describing future action

Questions

Incomprehensible/muttering

## Results and Discussion

Differences between the LD-H and LD-N groups on the cognitive tasks have been reported earlier (current author, Society for Research in Child Development, 1979); the focus of this presentation is on the private speech data. In particular, we examined the relationship between the private speech and cognitive data and the differences, if any, between the use of private speech by the LD-H and LD-N groups.

Pearson product-moment correlations between each private speech category and each cognitive task measure were examined for the total sample of 20 LD children and for the LD-H and LD-N subgroups separately. The subgroup correlation patterns, however, were, for the most part, reflections of the total sample patterns; for brevity, only the total sample patterns are reported here (see Table 1). Point biserial correlations between the conservation tasks and private speech categories were also examined (see Table 2). Means and standard deviations for each private speech category are found in Table 3.

Several consistencies can be found in these data. First, two cognitive tasks indicative of relative maturity (Block Design and use of the analytic strategy on the conceptual style test) were consistently negatively correlated to use of private speech. Block Design was related to Describing thing or environment ($r = -.46$, $p < .03$), Commands to self ($r = -.43$, $p < .03$), and the Regulating classification as a whole ($r = -.41$, $p < .04$). Use of analytic strategy was related to self-feedback ($r = -.38$, $p < .05$) and the overall Regulating classification ($r = -.39$, $p < .05$). In short, the children who appeared to be cognitively more mature used these self-regulatory types of private speech less than the less mature children.

In contrast, there was a strikingly consistent pattern in which children who successfully demonstrated conservation of volume (perhaps the most advanced type of conservation tested) used certain types of private speech more. Conservers of volume tended more often to use the following categories: Non-feedback emotional expressive ($r=-.55$, $p < .02$), Laughing ($r=-.50$, $p < .05$), Imitating objects,sound effects ($r=-.61$, $p < .01$), Fantasy descriptions of past/present action ($r=-.44$, $p < .05$) and future action ($r=-.44$, $p < .05$), the overall Affective ($r=-.49$, $p < .05$) and Fantasy/Role-playing ($r=-.61$, $p < .01$) classifications, and the Total amount of private speech ($r=-.49$, $p < .05$). These findings are in apparent contrast to the negative relationship reported above between speech and maturity. The differences are probably due both to the nature of the type of speech involved (mostly self-regulatory speech in the negative relationships, mostly affective or fantasy speech in the positive relationships) and to the level of cognitive tasks involved.

In support of the latter suggestion are the positive correlations found between use of the Scanning strategy in the Twenty-Questions game and Descriptions of environment ($r= .43$, $p < .03$), Descriptions of action ($r= .60$,

$p < .002$), Commands to self ($r = .48$, $p < .02$), Nonfeedback emotional expressive ($r = .57$, $p < .004$), Imitation of person ($r = .37$, $p < .05$), Fantasy descriptions of present/past ($r = .59$, $p < .003$) and future ($r = .42$, $p < .03$) action, and the overall Regulatory classification ($r = .50$, $p < .01$). Children who used these types of private speech used the Scanning strategy more often. This strategy is neither the most (Focus) nor the least (Random) mature; again, it appears that a relatively high level of private speech is coincident with some intermediate level or emerging cognitive skill.

Finally, private speech usage was somewhat correlated with Conners' teacher ratings of hyperactivity. Across LD-H and LD-N groups, the more active children used Self-feedback more ($r = .40$, $p < .05$) and Fantasy descriptions of action ($r = -.42$, $p < .04$) and Questions during Fantasy ($r = -.50$, $p < .02$) less. If descriptions and questions during fantasy can be presumed to have some regulatory function, these data are consistent with Copeland's (1979) report of less regulatory speech being used by hyperactive children.

Differences between the LD-H and LD-N groups in the types of private speech used were examined with a hyperactivity x category analysis of variance (anova) with the category factor including repeated measures. When a 2 (LD-H vs. LD-N) x 4 (Regulatory vs. Affective vs. Fantasy/Roleplaying vs. Incomprehensible) anova was done, no overall differences between the groups were found, $F(1,18) < 1$, n.s., but a category main effect, $F(3,54) = 4.20$, $p < .01$, and a tendency toward an interaction, $F(3,54) = 2.42$, $p < .08$, were found. Post hoc analysis revealed that the Fantasy/Roleplaying categories were used by the LD children more than the Affective ($p < .05$) and the Regulating ($p < .01$) categories. Fuson (1979) has suggested that when private speech is observed during free play, more fantasy and less regulatory speech would be expected; these results clearly support this suggestion.

Fuson (1979) has called for more information about "silent" children; in this study only three children (two from LD-H, one from LD-N) did not speak at all. Two others, both from LD-N, made only one utterance. Descriptions of these children's performance on the cognitive tasks are available.

Implications

Private speech analysis promises to be an important additional method of furthering our understanding of children's deficits in learning. In order to maximize this promise, the meaning of children's use of different categories must be made explicit. The current study addresses this need while highlighting the changing nature of speech and cognitive skill. Future studies with younger and older children will help describe more fully these developmental sequences.

Table 1

Correlations between Cognitive and Private Speech Measures for Total Sample

| | | WISC-R | | Conceptual Style | | | Twenty Questions | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Con-ners | Vocab-ulary | Block Design | Func-tional | Ana-lytic | Super-ordinate | Focus | Scan | Random | Mixed |
| Regulating[a] | .34 | -.11 | -.40b | -.13 | -.39b | .09 | -.14 | .50d | -.25 | -.17 |
| Desc thing/envt. | .38 | -.09 | -.46c | -.15 | -.37 | .10 | -.12 | .43b | -.21 | -.14 |
| Desc own action | .00 | -.14 | -.10 | .01 | -.32 | .02 | -.13 | .60d | -.32 | -.20 |
| Desc internal state | .18 | -.13 | .00 | .05 | -.24 | -.01 | -.10 | .36 | -.16 | -.17 |
| Commands | .35 | -.07 | -.43b | -.15 | -.33 | .10 | -.10 | .48c | -.26 | -.16 |
| Questions[f] | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Response to questions[f] | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Self-feedback | .40b | -.12 | -.34 | -.22 | -.38b | .08 | -.18 | .19 | -.05 | .00 |
| Affective[a] | .04 | -.20 | .12 | -.15 | -.25 | -.01 | -.22 | .33 | -.07 | -.19 |
| Word play | .07 | -.10 | .11 | -.06 | -.14 | -.01 | -.10 | -.18 | .24 | -.17 |
| Singing | .08 | -.16 | .23 | -.06 | -.14 | -.05 | -.15 | .12 | .05 | -.21 |
| Emotional expressive | .02 | -.19 | -.04 | -.24 | -.28 | .03 | -.26 | .57d | -.25 | -.14 |
| Laughing | -.15 | -.12 | .17 | -.06 | -.22 | .00 | -.13 | .30 | -.16 | .00 |
| Fantasy/Roleplaying[a] | -.24 | -.19 | .19 | -.02 | -.14 | -.13 | -.23 | .34 | -.18 | .15 |
| Imitating persons | -.21 | -.07 | .35 | -.25 | -.29 | -.10 | -.07 | .37b | -.21 | -.11 |
| Imitating objects | -.21 | -.18 | .20 | -.05 | -.12 | -.13 | -.23 | .22 | -.11 | .19 |
| Commands | -.04 | -.10 | -.08 | .33 | -.17 | -.15 | -.12 | .09 | -.12 | .36 |
| Desc present/past | -.12 | -.19 | .17 | -.07 | -.19 | -.06 | -.19 | .59d | -.30 | -.15 |
| Desc future | -.42b | -.08 | .03 | -.06 | -.17 | .00 | -.10 | .42b | -.25 | -.03 |
| Questions | -.50c | -.09 | -.14 | -.04 | -.17 | -.02 | -.12 | .00 | .05 | .05 |
| Incomprehensible/Muttering | .23 | -.04 | -.21 | -.20 | -.26 | .13 | -.17 | .32 | -.17 | -.11 |
| Total | .01 | -.20 | .00 | -.14 | -.30 | -.02 | -.28 | .48c | -.21 | -.03 |

a Represents sum of specific category frequencies.
b $p < .05$
c $p < .02$
d $p < .01$
e $p < .001$
f categories never used

Table 2

Point Biserial Correlations between Conservation Tasks and Private Speech Measures for Total Sample

| | Number | Length | Weight | Volume |
|---|---|---|---|---|
| Regulating [a] | .13 | .08 | .02 | .02 |
| Desc thing/envt. | .17 | .14 | -.03 | .12 |
| Desc own action | -.03 | -.09 | .26 | -.30 |
| Desc internal state | -.19 | -.24 | .21 | -.19 |
| Commands | .18 | .16 | -.05 | .18 |
| Questions [f] | -- | -- | -- | -- |
| Response to questions [f] | -- | -- | -- | -- |
| Self-feedback | .07 | .00 | -.12 | -.20 |
| Affective [a] | -.25 | -.34 | .21 | -.49b |
| Word play | -.19 | -.24 | .21 | -.19 |
| Singing | -.27 | -.36 | .22 | -.31 |
| Emotional expressive | -.14 | -.23 | .11 | -.55c |
| Laughing | -.14 | -.20 | .26 | -.50b |
| Fantasy/Roleplaying [a] | .09 | .00 | .18 | -.61d |
| Imitating persons | .13 | .11 | .15 | .13 |
| Imitating objects | .65 | -.03 | .10 | -.61d |
| Commands | .22 | .19 | .25 | -.41 |
| Desc present/past | -.05 | -.13 | .34 | -.44b |
| Desc future | .19 | .16 | .21 | -.44b |
| Questions | .22 | .19 | -.17 | -.22 |
| Incomprehensible/Muttering | .20 | .13 | .07 | -.03 |
| Total | .07 | -.04 | .19 | -.49b |

Note: Conservers received a "1" and nonconservers received a "2;"positive correlations, then, denote nonconservers' higher use of category.

a Represents sum-of specific category frequencies.
b $p < .05$
c $p < .02$
d $p < .01$
e $p < .001$
f categories never used

Table 3

Means and Standard Deviations of Private Speech Categories

| | | LD-H | LD-N |
|---|---|---|---|
| Regulating [a] | M | 3.60 | .40 |
| | SD | 6.24 | .84 |
| Desc thing/envt | M | 1.70 | .10 |
| | SD | 3.16 | .32 |
| Desc own action | M | .50 | .20 |
| | SD | 1.08 | .63 |
| Desc internal state | M | .20 | .00 |
| | SD | .42 | .00 |
| Commands | M | .80 | .00 |
| | SD | 1.75 | .00 |
| Questions | M | .00 | .00 |
| | SD | .00 | .00 |
| Response to questions | M | .00 | .00 |
| | SD | .00 | .00 |
| Self-feedback | M | .40 | .10 |
| | SD | .52 | .32 |
| Affective [a] | M | 6.70 | 3.40 |
| | SD | 9.20 | 2.80 |
| Word play | M | .60 | .00 |
| | SD | 1.27 | .00 |
| Singing | M | 2.50 | .90 |
| | SD | 4.91 | 1.29 |
| Emotional expressive | M | 3.30 | 2.40 |
| | SD | 3.80 | 2.27 |
| Laughing | M | .30 | .20 |
| | SD | .68 | .63 |
| Fantasy/Roleplaying [a] | M | 6.60 | 14.00 |
| | SD | 8.29 | 18.21 |
| Imitating persons | M | .00 | .40 |
| | SD | .00 | 1.27 |
| Imitating objects | M | 4.70 | 10.00 |
| | SD | 6.85 | 12.94 |
| Commands | M | .30 | 1.10 |
| | SD | .65 | 2.51 |
| Desc present/past | M | 1.60 | 1.50 |
| | SD | 3.13 | 2.32 |
| Desc future | M | .00 | .60 |
| | SD | .00 | 1.27 |
| Questions | M | .00 | .40 |
| | SD | .00 | .70 |
| Incomprehensible/Muttering | M | 6.70 | 4.20 |
| | SD | 10.07 | 4.73 |
| Total | M | 23.60 | 22.10 |
| | SD | 26.51 | 24.00 |

a Represents sum of specific category frequencies.

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